Mandibular and Maxillary Anesthesia

Uses of the Conduction Technique

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• **A series of techniques for obtaining specific nerve-block anesthesia of the oral cavity and jaws is examined in relationship to the anatomical site to be anesthetized, whether for operation or diagnosis.**

This method of anesthesia is considered superior to the field-block approach—that is, the general diffusion of anesthetic agent through or about the proposed operative site.

The final goal of a surgeon using local anesthesia is the gaining of specific nerve-block anesthesia as a prelude to operation.

THE ARMAMENTARIUM of a surgeon who operates on the head and neck should include the ability to obtain successful local anesthesia of the oral and facial areas. The method of choice should be conduction anesthesia when possible. By conduction anesthesia is meant the specific interceptive blocking of a given nerve. This term is in contradistinction to the field block obtained by general diffusion of the anesthetic agent through or about the proposed operative site. The field block is a satisfactory choice where specific nerve block cannot be successfully applied or where the conductive block must be augmented. The conduction technique is of perhaps greatest value when infection or a malignant lesion precludes the insertion of a needle at a given site.

In this discussion the advantages of various local anesthetic agents will not be weighed, but the author personally prefers to use lidocaine or procaine (1 or 2 per cent as indicated) routinely, in that order of preference. If there is no contraindication to the use of epinephrine, a 1:1000 solution is added to the anesthetic blocking agent, up to the amount of 0.1 cc. Epinephrine is of value in preventing the rapid absorption of the anesthetic agent which, in turn, helps to avoid a high blood level and a toxic reaction; it also prolongs the operative analgesia time.

The nerve blocks herein described are those related to the second and third divisions of the trigeminal (fifth cranial) nerve. Because of the numerous exits of the various divisions, the branches may be blocked singly or in various combinations. It is felt that the following techniques are basic and sufficient for ordinary procedures of the maxillofacial area. They do not include, by any means, all the numerous blocks which have been mapped out to gain specific anesthesia of this area.

ANESTHETIC METHODS

Before the insertion of the needle, the field is prepared with an antiseptic agent in a suitable manner and, if necessary, draped with sterile towels. The appropriate needle is fitted to a Luer-lok syringe of the size desired. A spinal needle with trochar may be utilized for the deeper blocks. During the process of insertion, suction is applied with the syringe so that no solution enters a vessel, and aspiration is again carried out when the needle is considered to be at the final, correct location to make sure that the tip is not in a blood vessel.

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Mandibular Block

Mandibular block may be done for surgical, diagnostic or therapeutic purposes. It is used for operations or manipulations of the mandible, including the teeth, the gingiva and the lower lip, as well as the anterior two-thirds of the tongue and the region of the joint capsule. It also produces anesthesia of the motor branch of the trigeminal nerve which supplies the muscles of mastication. When it is successfully performed, complete anesthesia of the entire division of the trigeminal nerve is effected.

Landmarks. The sigmoid or mandibular notch, together with the lower border of the zygomatic arch, may be outlined by pen on the face of the patient (Figure 1, A). The location is made easy through palpating the area by opening and closing the mouth. The needle is then introduced at the central point.

Technique. A No. 25 hypodermic needle is inserted into the skin, and a wheal is raised. A 6 cm., No. 21 or 22 gauge needle is then introduced into the wheal at right angles to the cheek surface directly through the mandibular notch and advanced approximately 3 cm. A small amount of anesthetic solution may be deposited from time to time to prevent extreme pain. The point of the needle is then elevated slightly and advanced another 2 cm. By

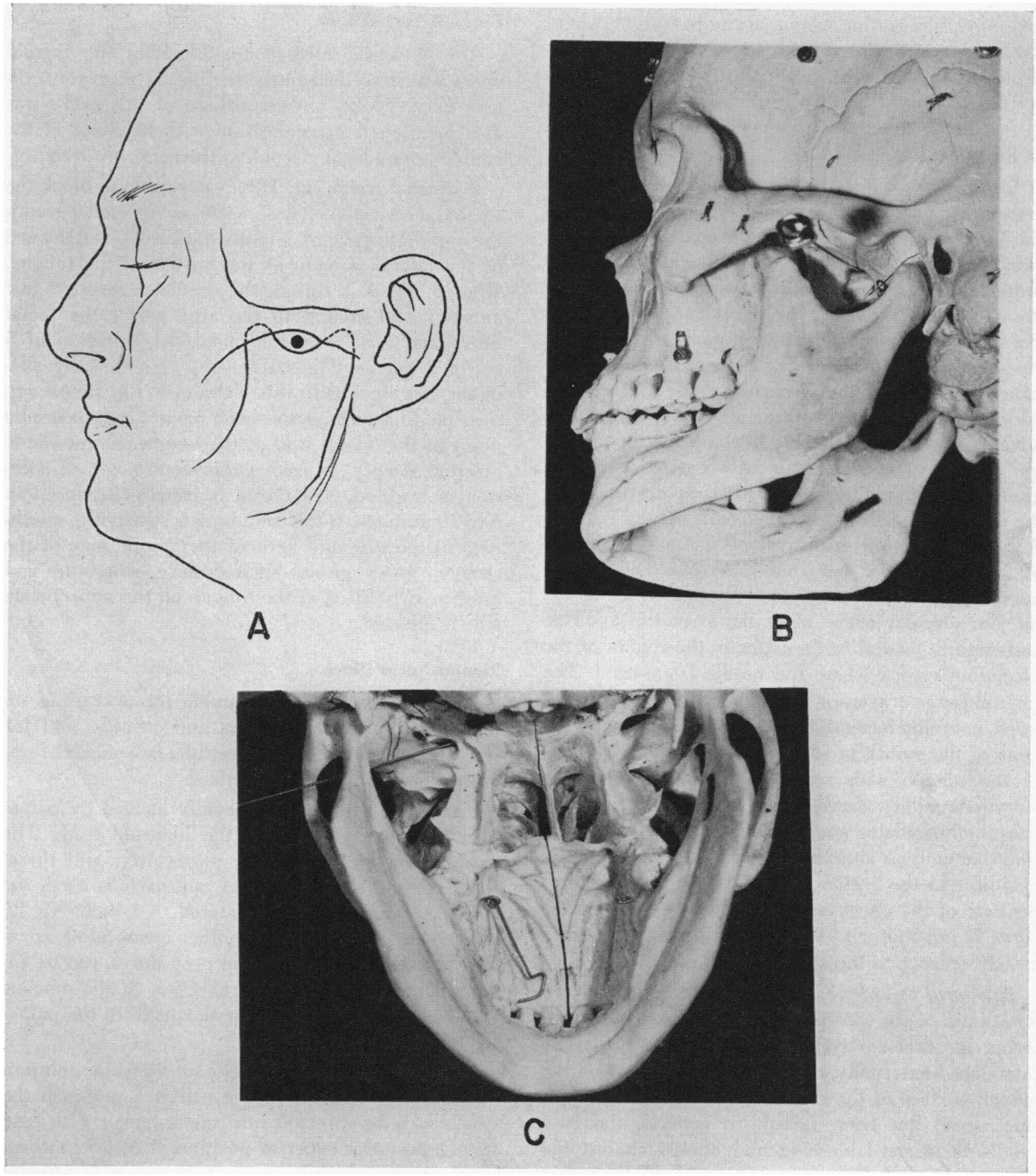

Figure 1, *A, B, and C.*—Mandibular nerve block.

then the needle has usually come against the smooth undersurface of the greater wing of the sphenoid bone, just external to the foramen ovale (Figure 1, B and C). In general, the needle should not be introduced more than 5 cm. At this point, 3 cc. to 5 cc. of lidocaine is released. The needle is withdrawn, and the onset of analgesia is usually noted in 5 to 15 minutes. The period of anesthesia may range from one to two hours or more, depending upon the accuracy of the block and the use of a vasoconstrictor.

The following procedures are subdivision blocks of the mandibular nerve and may be performed when the extent of anesthesia is to be limited to an appropriate portion.

Pterygomaxillary Block

The inferior alveolar nerve is distributed to the mandible, lower teeth, gingiva, lower portions of the face and lower lip. After separating from the common mandibular trunk, it descends on the medial as-

pect of the ascending ramus of the mandible, where it enters the inferior dental foramen approximately 1 cm. above the surface of the lower molars and courses through the canal of the mandible to supply the teeth. At the mental foramen a branch emerges as the mental nerve.

Intraoral technique. With the forefinger in the retromolar trigone, the needle is advanced toward the finger to a point of insertion medialward and 1 cm. above the occlusal surface of the last molar tooth. The initial position of the syringe is such that the needle will pass through the trigone as the shaft lies at a point between the lateral incisor and first bicuspid of the opposite side. The needle is then advanced until the bone is encountered. The syringe and needle are shifted to the side of anesthesia and advanced parallel to the molar along the inner margin of the ramus. Advancement is carried to the region of the lingula, and the shaft is again rotated to the middle or slightly to the opposite side (Figure 2, A). Anesthesia will be effectively gained by release of 2 to 4 cc. of 2 per cent lidocaine. The lingual nerve is usually anesthetized at the same time as the inferior alveolar nerve, since the former is anterior and slightly medial to the latter in the region of the ascending ramus where the needle is inserted. The lingual nerve traverses inward, forward and downward, coursing beneath the mucous membrane of the floor of the mouth to supply the anterior two-thirds of the tongue with sensation. In performing the pterygomaxillary nerve block, one usually anesthetizes the buccinator nerve, which is the sensory division that courses lateralward across the ramus of the mandible to the region of the mucous membrane of the side of the cheek in its innermost portion. This nerve is not motor to the buccinator muscle, but is merely sensory to the area of the cheek.

Extraoral technique. When it is desired to obtain anesthesia of the inferior alveolar nerve without entering the oral cavity, a 6 to 8 cm. needle may be introduced externally at the angle of the jaw on the medial surface of the ramus of the mandible after a skin wheal has been raised. In general, the long needle is inserted close to and almost against the inner surface of the ramus of the mandible so that its path will pursue a position midway between the anterior and posterior border of the ramus and traverse one-half to two-thirds of the distance between the angle and the sigmoid notch (Figure 2, B). As in the intraoral injection, 2 to 4 cc. of 2 per cent lidocaine solution is usually sufficient to produce anesthesia. Indications for this procedure are exactly the same as for intraoral block except that the mouth is not entered. This method, however, does not so easily gain anesthesia of the lingual nerve as does the oral technique.

Lingual Nerve Block

The intraoral method for blocking the lingual nerve was described in the section on pterygomaxillary nerve block, and anesthesia of this nerve was also mentioned in connection with blocking of the common mandibular trunk at the foramen ovale.

Extraoral technique. If it is desirable to block the lingual nerve alone, the needle is inserted beneath the mandible upward, slightly backward, and inward to the lateral portion of the border of the tongue. After a wheal is raised, the needle is inserted just anterior and medial to the area where the facial nerve and vein cross the mandible. Injection of 5 cc. of 2 per cent lidocaine solution is usually adequate, but since with this technique it is almost impossible to determine the exact position of the needle point in the lateral wall of the tongue, the needle is inserted deeper as each cubic centimeter of solution is injected. Anesthesia is usually produced in 5 to 10 minutes. If the technique is successful, numbness of the side and floor of the mouth, side of the tongue, lower gums, submaxillary ganglion, and interior two-thirds of the tongue on the appropriate side is effected.

Mental Nerve Block

Mental nerve block is suitable for operations on the lower lip, lower incisors and cuspids, and for work on the mandible between the two mental foramina when both are anesthetized.

The mental foramen is usually located by palpation beneath and between the bicuspid teeth. The opening inclines somewhat posteriorly, and therefore, when the oral route of approach is used, the foramen cannot be easily entered. A 1-inch, No. 25 gauge needle is suitable for either intraoral or extraoral blocking and, in the oral procedures, can be advanced through the lower reflection of the mucous membrane between the premolar teeth to the palpable area of the foramen.

For complete anesthesia 2 cc. of lidocaine solution is usually adequate. For the external approach the needle can be directed into the foramen with ease from a posterior-superior position after a skin wheal has been raised. Only when the foramen is actually entered can adequate anesthesia of the incisors be assured.

Maxillary Nerve Block

Maxillary nerve block is used when the upper jaw, including the teeth, gingiva and maxillary bone, the upper lip, a small portion of the inner angle of the nose and lower eyelid, the antrum, palate and a portion of the tonsils are to be anesthetized. The maxillary branch of the trigeminal nerve is a sensory one. It leaves the skull through the foramen rotundum,

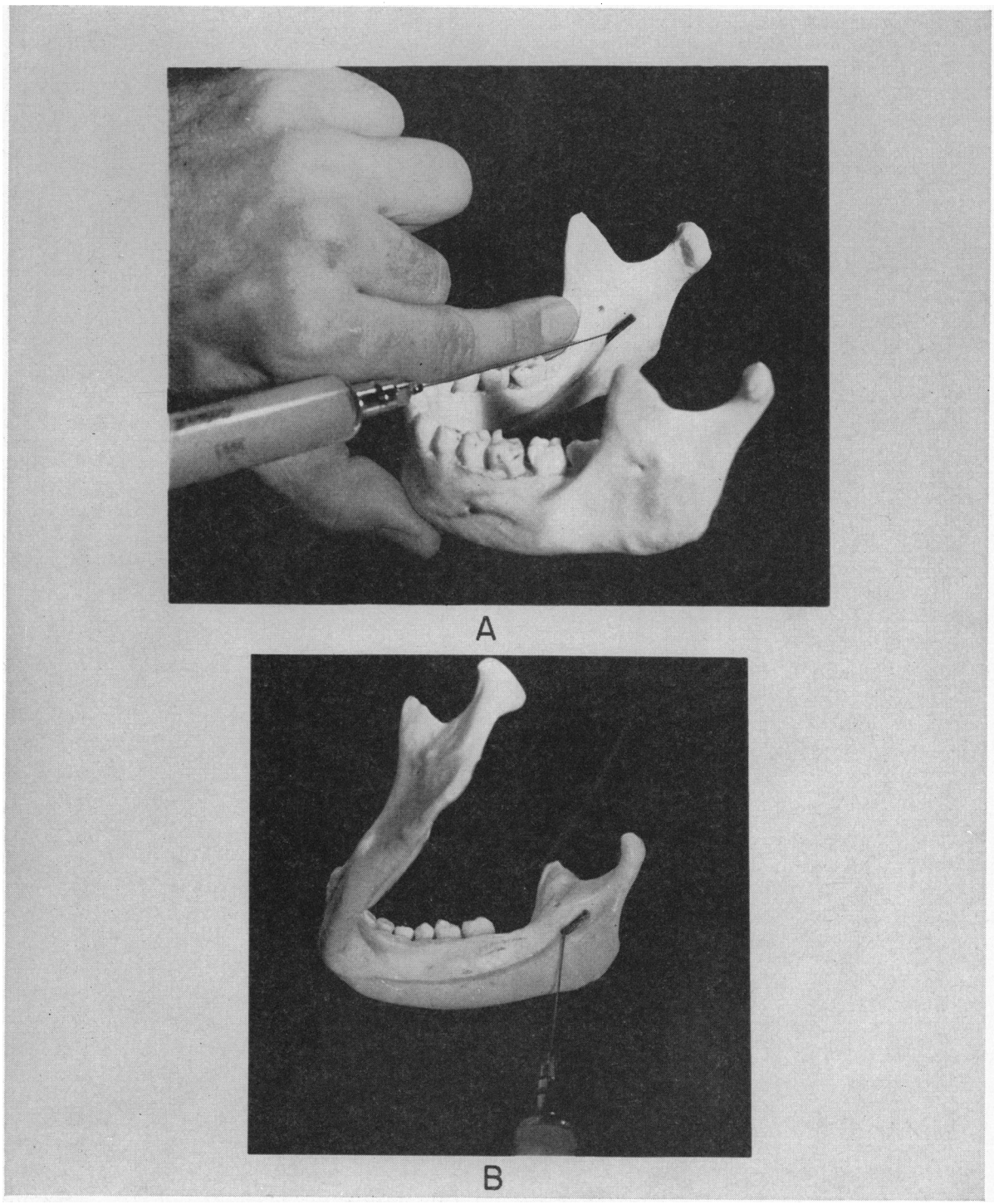

Figure 2.—Inferior alveolar nerve block. *A*—Intraoral position. *B*—Extraoral position.

passes through the pterygomaxillary or pterygopalatine fissure, and enters the inferior orbital fissure, traversing it anteriorly.

Landmarks. The anterior border of the ramus of the mandible and the coronoid process are palpated and then outlined on the cheek of the patient by having him gently open and close his mouth so that the anterior border of the ramus may be located easily. Next, the root of the zygomatic process is palpated, and the point at which it intersects the anterior border of the ramus is the zygomatic angle (Figure 3, A). At this angle the needle is introduced.

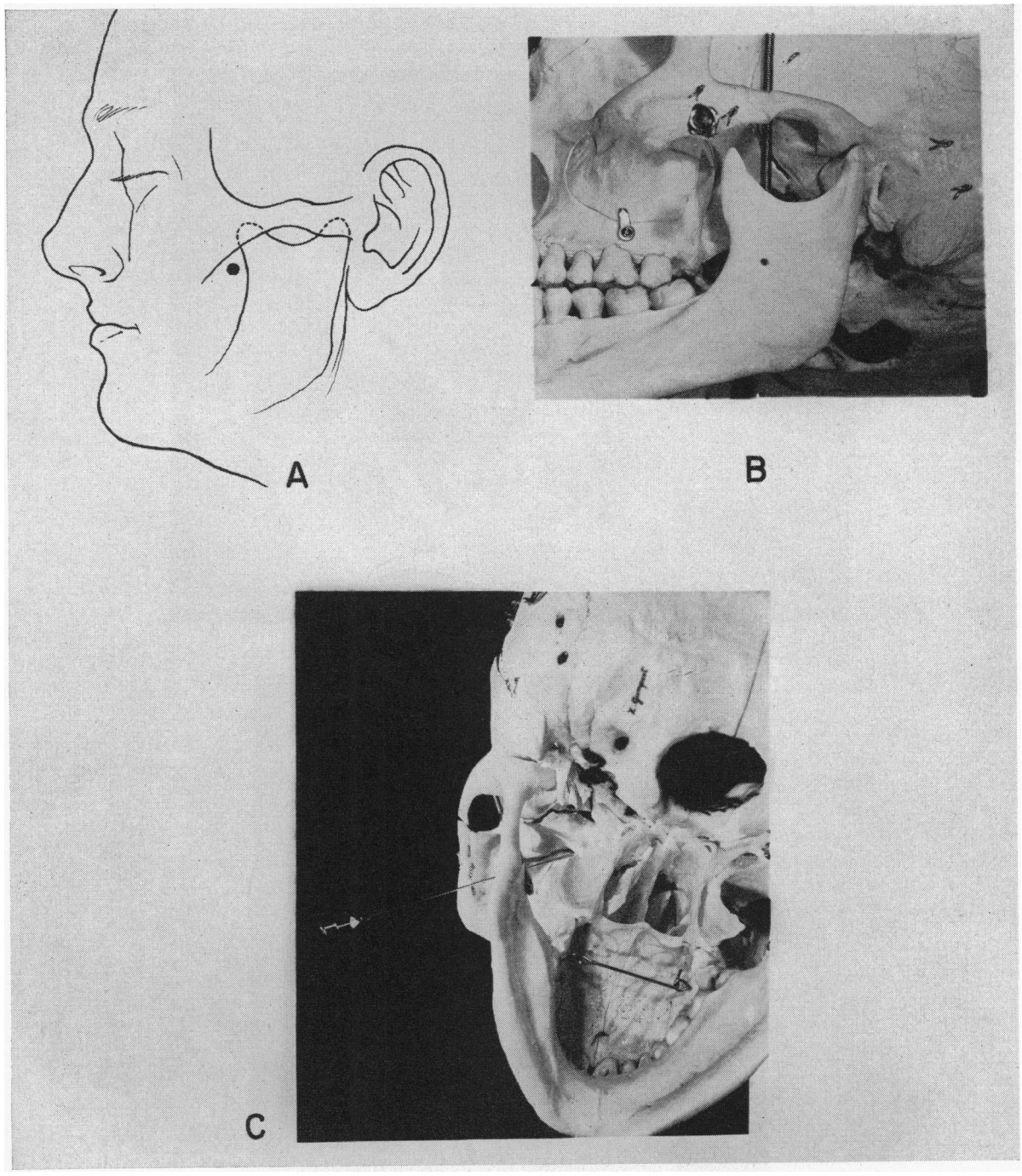

Figure 3, *A, B, and C.*—Maxillary nerve block.

Extraoral technique. The procedure is best performed with the patient lying supine on the operating table with the side to be anesthetized slightly upward. After a wheal has been made with the hypodermic needle, a 7.5 cm., No. 22 gauge needle is introduced horizontally at right angles to the cheek and inserted to a depth of approximately 2.5 cm. At this point the maxillary tuberosity is usually encountered; the needle is disengaged from the periosteum of the tuberosity and directed slightly backwards, clearing it; advancement upward to a depth of 5 cm. is then made, when bone will be encountered again. During the entire process, aspiration is done continually, as well as deposition of small amounts of solution to render the procedure less painful. If the needle has been properly directed, the point will now be in the pterygopalatine fossa at the region of the foramen rotundum (Figure 3, B and C). At the fora-

men 3 to 4 cc. of 2 per cent lidocaine can be introduced slowly. Analgesia for operation should develop in 5 to 15 minutes; the duration is from an hour to an hour and a half and is obviously greater if small amounts of epinephrine have been combined with the anesthetic agent. Since care must be taken to avoid entering the orbit, the patient should be closely questioned about any pain in the orbital area. In rare instances, if the needle has been advanced too far superiorly in the pterygopalatine fossa, it is possible to enter the infraorbital fissure and cause damage to the structures of the orbit.

Sphenopalatine Ganglion Block

The sphenopalatine ganglion rests in the pterygomaxillary area and arises or originates from the sphenopalatine branch of the maxillary division of the trigeminal nerve. The fossa in which it rests can be reached by passing a needle through the posterior palatine foramen and canal. The foramen is medial to the second molar tooth at the posterior end of the hard palate. Indications for this block are anesthesia for operations on the maxillary sinus and, therapeutically, for neuralgia involving the sphenopalatine ganglion and the inner nerve loop.

Technique. The patient is placed with the head back and the mouth open as wide as is possible. The region of the posterior palatine foramen is palpated and a small wheal is raised at this site. Next, a long, angled No. 22 gauge needle is introduced into the palatine foramen and canal and is advanced approximately 1 inch in depth until it strikes a bony plate. Aspiration is done at appropriate intervals to make sure that the needle is not threaded into a vein or artery. Usually 2 cc. of 1 to 2 per cent lidocaine solution is sufficient for adequate anesthesia of the ganglion. If, as in some cases, the needle will not traverse the posterior palatine canal, the foramen rotundum nerve block, previously described, can be used, since essentially the same topographical areas of anesthesia will result.

Incisive Foramen Block or Anterior Palatine Injection

The two nasopalatine nerves supply sensation to and ramify through the maxillary bones, the lingual alveolar plate, and the periosteum and mucous membrane on the central and lateral incisors and the cuspid teeth where they interlace with the anterior palatine nerves coming from the posterior palatine foramina.

Technique. For adequate anesthesia of this area the incisive foramen is entered in the following manner. A 1-inch, No. 23 or No. 25 gauge needle is introduced just lateral to the central papilla behind the incisor teeth and a few drops of lidocaine are deposited. This entrance avoids excessive pain. The needle is then advanced through the papilla in a line between the two central incisor teeth and parallel to the long axes. When entrance into the foramen is made, 1 cc. of solution is released. In order to obtain complete anesthesia of the nasopalatine nerves, the incisive foramen must be entered.

Posterior Palatine Block

Posterior palatine block is necessary for any operation that involves the palatal alveolar plate or that invests soft tissues, and for extractions of the posterior molar teeth. The anterior palatine nerve enters the oral cavity at the posterior palatine foramen opposite to the second molar and innervates the palatal plate of the molars and bicuspids, but not the dental pulps of those teeth.

Landmarks. The position of the posterior palatine foramen is usually marked by a depression. If this is not the case, an interruption of continuity of the bony hard palate, which is medial to the second molar, can be palpated with a finger. At that point a curved tonsil needle may be introduced into the foramen and approximately 1 cc. of 2 per cent lidocaine released. The depth reached need not be so great as that necessary for anesthesia of the sphenopalatine ganglion. Anesthesia is established in approximately 2 minutes after injection. The anterior palatine nerve interlaces with the nasopalatine nerve at the cuspid tooth. Both nerves must be anesthetized to produce complete palatal anesthesia.

Tuberosity Block

Tuberosity block is used for anesthesia of the posterior superior alveolar nerve. The posterior superior alveolar nerve supplies the second and third molars and half of the first molar with sensation, as well as the buccogingival tissue contiguous to these teeth. The foramen for this nerve is located on the zygomatic surface of the maxilla.

Technique. A 4 cm., No. 21 gauge needle is inserted into the mucosa at the reflection of the mucous membrane behind the last superior molar by first holding the syringe parallel with the alveolar plate and at an angle of 45 degrees with the occlusal surface of the upper teeth. The needle is then advanced through the buccinator muscle and the syringe is rotated outward as far as the angle of the mouth will permit. The needle is advanced superiorly and internally with care to hug the tuberosity. A few drops of solution are injected as the needle advances and, at the correct depth, the bulk of the solution is deposited. Two cubic centimeters of lidocaine is usually effective. In this particular injection, care should be taken to avoid the pterygoid venous plexus by remaining close to the bone and by making sure through aspiration before injection of the an-

esthetic agent. The procedure does not produce anesthesia of the palate, and for complete anesthesia of the posterior portion of the alveolar ridge, it must be combined with the block of the posterior palatine foramen.

Anterior Infraorbital Block

If anterior infraorbital block is properly carried out, the bicuspid as well as the anterior teeth are anesthetized. In some cases the three upper molars and contiguous alveolar plate can also be anesthetized. The sphenopalatine ganglion is occasionally reached with complete inner loop anesthesia. The success varies with both the anatomical nature of the foramen and the method of introduction.

Intraoral technique. An imaginary line is established from the pupil of the patient's eye to the long axis of the second bicuspid tooth. The infraorbital ridge is palpated, and the infraorbital foramen, which will be found slightly below on the imaginary line, may be palpated with the index finger while the lip is retracted with the thumb. A 1½ inch, No. 21 gauge needle is introduced into the reflection of the mucous membrane as high as possible and slightly away from the bone. The tip of the needle is introduced along the line to the foramen, and the bulk of solution is deposited at this point.

Extraoral technique. On the same axis as previously mentioned, the foramen is palpated approximately one-half inch below the infraorbital ridge. After insertion into the skin, a 1-inch, No. 25 gauge needle is directed at right angles to the foramen which opens slightly downward and medialward. After partial anesthesia of the soft tissues, the foramen aperture is sought; when it is finally gained, the solution is deposited to the extent of approximately 2 cc. or more of lidocaine. When it is desired to operate to the midline, the interlacing branches of the opposite infraorbital nerve must be blocked in the same manner.

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